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A CLINICAL AND COMMUNITY BASED MICROCOMPUTER PROGRAM THAT ORGANIZES AND COORDINATES THE CARE OF HYPERLIPIDEMIC PATIENTS AND THEIR FAMILIES

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This program stores data related to the diagnosis and management of hyperlipidemias for individual patients, families and groups of patients of physicians in community practice.

The program accomplishes these goals by defining a series of modules: a screening module that relates to limited screening data utilized by community based mass screening programs; a laboratory module (LIPSCREEN) that relates to lipid data output received directly from hospital laboratory equipment and an extensive lipid clinic data management module capable of supporting extensive data sets related to the initial diagnosis and management of hyperlipidemic patients. The extensive lipid clinic module provides defined data elements related to baseline diagnosis, historical and physical exam data and subsequent visit data to the lipid clinic. In addition to storing defined data fields, there is a capability for storing free text of baseline and serial visit information.

Reporting capabilities of the program include clinical flow sheets for both physicians and patients, computer generated letters to referring physicians, grouping of test data by physicians, as well as the standard robust reporting capabilities of the dBase environment.

This program has been written in dBase III plus and Foxbase. It runs on the IBM family of microcomputers.

COMPUTER SIMULATION OF HEART-PACEMAKER INTERACTION AND ITS CLINICAL UTILITY

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A computer model of cardiac rhythm disturbances and of the heart - pacemaker interaction has been implemented on different mini- and microcomputers. The current version of the model is running on IBM PC AT compatible computers. It enables different configurations of heart images to be created and its implementation contains a large library of pacemaker algorithms including both clinically realistic and experimental modes. The model also incorporates important electrophysiological properties of the cardiac structures, including appropriate cycle length dependence of refractory periods and conduction times.

The model has been employed in various experiments: simulation of pacemaker mediated reentry tachycardia and pacemaker algorithms preventing such tachycardia, simulation of atrioventricular reentry tachycardia and its prevention by DDD pacing, etc. An explanation of a complicated clinical case in which a DDD device resulted in atrioventricular tachycardia, has also been suggested using the model.

A new version of the model is under development which introduces several new clinically important aspects including (a) construction of patient oriented cardiac models related to electrophysiologic studies (EPS), (b) realistic models of pacemaker programming based on simulation of clinical programming devices, (c) real-time control of simulation experiments enabling very complicated disturbances of spontaneous cardiac activity to be investigated, (d) problem oriented data bases of clinically important rhythm disturbances for systematic pre-clinical testing of new pacing algorithms, and (e) output of modelling studies in the forms of simulated electrocardiograms, detailed tracing channels, modelled His recordings and intracardiac conduction records, and itemised protocols for each experiment.

Clinical use of the model shows that computer simulation is an important tool for pre-clinical testing of new pacemaker modes and for patient oriented studies in which computational experiments based on the results of EPS can suggest and verify appropriate pacemaker programming.

Monday, March 19, 1990
1:30PM–5:00PM
Booth #1760, New Orleans Convention Center
Pacemaker and Vector Programs

COMPUTER-ASSISTED MODE SELECTION IN ANTI-BRADYARRHYTHMIA PACING

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An algorithm for recommending appropriate pacing modes on a patient-by-patient basis was developed based upon criteria agreed upon by 32 implanters at the Newark Beth Israel Medical Center. Determining factors include the patient's overall medical status, anterograde and retrograde conduction, spontaneous atrial rate and rhythm, ventricular hemodynamics, evidence of chronotropic incompetence, projected activity level, drug regimen, and anticipated progression of disease.

As the algorithm can be represented completely as a decision tree, (allowing paper-and-pencil implementation if desired), it was unnecessary to design a rule-based system for implementation using an expert-system shell. A set of computer programs was developed in dBXL for implementation on a personal computer. The computer stores 11 pieces of encoded clinical data for each patient, and rapidly calculates a suggested mode or modes on the basis of the algorithm. At the same time, the data are appended to a database that is intended ultimately to contain mode-selection information about all patients undergoing permanent-pacemaker implantation at this institution. The mode actually selected by the implanters is also recorded in the database, and the computer can select those records for which the modes used differ from those recommended.

After restrospective testing in more than 150 cases, this decision model is being prepared for routine use prior to pacemaker implantation.

A RULE BASED EXPERT SYSTEM TO ASSESS PACING INDICATION

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The implantation of permanent pacemakers has come under increasing scrutiny in the recent era of cost containment and peer review. Based on published data and our own experience, a computer based expert system was developed to aid in the assessment of pacing indication. Using an expert shell on a PC platform, 120 rules were developed. Through an interactive question and answer session between the program and user, a recommendation is generated. Possible outputs include Class I (indicated), Class II (possibly indicated), Class III (not indicated). An explanation for the recommendation is also provided. The program was tested retrospectively on 49 consultations already performed at University Hospital with the following results:

Agreement between expert system and consult: 44
Discrepancy between system and consult : 5

In all five discrepancies the decision algorithm was judged correct upon case review. A prospective evaluation currently in progress has correctly assessed eight consultations. We conclude that a rule based expert system can effectively assist the physician in assessing the need for a permanent pacemaker and guide the work up.